

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference IPY-150	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/JP2004/004507	International filing date (day/month/year) 30.03.2004	Priority date (day/month/year) 31.03.2003
International Patent Classification (IPC) or national classification and IPC		
Applicant UBE INDUSTRIES, LTD.		

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>10</u> sheets, including this cover sheet.
3.	This report is also accompanied by ANNEXES, comprising: <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>1</u> sheets, as follows: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4.	This report contains indications relating to the following items: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

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Box No. I

Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-19 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. 1-8 _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* 9, 11-14 _____ received by this Authority on 31.01.2005
- nos.* _____ received by this Authority on _____
- ☒ the drawings:
- sheets 1/8-8/8 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☒ the claims, nos. 10 _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	1-9, 11-14	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-9, 11-14	NO
Industrial applicability (IA)	Claims	1-9, 11-14	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
Document 1: JP 2003-017973 A (Murata Mfg. Co., Ltd.), 17 January 2003, entire text and all drawings			
Document 2: JP 59-086916 A (Murata Mfg. Co., Ltd.), 19 May 1984, page 2, lower right column, lines 3 to 13, and fig. 3 and 4			
Document 3: JP 2001-004470 A (Hitachi, Ltd.), 12 January 2001, page 4, right column, lines 8 to 10 and all drawings			
Claims 1 and 2			
Claims 1 and 2 do not involve an inventive step in the light of document 1 and document 2 cited in the international search report.			
Document 1 discloses the invention of a "piezoelectric thin film device that comprises a substrate, which has a vibration space, and a piezoelectric laminated structure, which has been formed upon the upper surface side of said substrate, wherein said piezoelectric laminated structure is configured from a piezoelectric film and electrodes that have been formed on both surfaces thereof while said vibration space is formed so as to allow the vibration of the vibrating part, which is configured in a manner such that it			

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

includes at least one portion of the aforementioned piezoelectric laminated structure; therein, said piezoelectric thin film is characterized in that the vibration space is configured from a first via hole, which has been formed towards the upper surface of the substrate from the lower surface of the substrate, and second via holes, which are formed towards the upper surface of the substrate at positions on the inside of the first via hole as viewed from the vertical direction." In addition, the technical feature of forming a vibration space that comprises an "intermediate surface" when creating a vibration space by means of a plurality of steps is well known, as disclosed in document 2.

Consequently, it would be easy for a person skilled in the art to conceive of forming the "intermediate surface" that is disclosed in document 2 in the invention that is disclosed in document 1.

Furthermore, the feature of forming a plurality of vibrating parts upon the upper surface side of a substrate is disclosed in document 1.

Claims 3 and 4

Claims 3 and 4 do not involve an inventive step in the light of document 1 and document 2 cited in the international search report.

Configuring the inventions that are disclosed in documents 1 and 2 so that "the second via holes are positioned at least 2 μm to inside the first via hole" and the "depth of the via holes is between 10 to 150 μm " is merely a design matter that could have been configured by a person skilled in the art in order to accommodate

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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the desired size of the element, the desired size of the vibration space and the like, as appropriate.

Claims 5 and 6

Claims 5 and 6 do not involve an inventive step in the light of document 1 and document 2 cited in the international search report.

The inventions set forth in claims 5 and 6 pertain to a method for producing the piezoelectric thin film device that is set forth in claims 1 and 2 by means of a conventional technique; therefore, it would have been easy for a person skilled in the art to conceive of the invention in question in the light of documents 1 and 2.

Claim 7

Claim 7 does not involve an inventive step in the light of document 1 and document 2 cited in the international search report.

The feature of using a SOI wafer as the substrate material and then configuring the bottom surface of the first via hole from a portion of the insulating layer is disclosed in document 1.

Claim 8

Claim 8 does not involve an inventive step in the light of document 1, document 2 and document 3 cited in the international search report.

The technique for forming via holes by means of a deep reactive ion etching method is well known, as disclosed in document 3.

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Claim 9

Claim 9 does not involve an inventive step in the light of document 1 and document 2 cited in the international search report.

Configuring the inventions that are disclosed in documents 1 and 2 so that the second via holes are "5 to 50 μm " from the end part of the bottom surface of the first via hole is merely a design matter that could have been configured by a person skilled in the art in order to accommodate the desired size of the element, the desired size of the vibration space and the like, as appropriate.

Claims 11 and 14

Claims 11 and 14 do not involve an inventive step in the light of document 1 and document 2 cited in the international search report.

When producing a piezoelectric thin film device, the question of whether the level of resonant frequency distribution for determining whether the article is nondefective should be set to a level of 'within $\pm 0.1\%$ ' or to a level of 'within $\pm 0.42\%$ ' is merely a design matter that could have been configured by a person skilled in the art in order to accommodate the desired degree of design precision, as appropriate.

Claims 12 and 13

Claims 12 and 13 do not involve an inventive step in the light of document 1 and document 2 cited in the international search report.

When forming a pattern by means of photolithography, the question of whether to delimit a

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range of "0.5 to 4.0 μm " for the thickness of the photoresist is merely a design matter that could have been configured by a person skilled in the art, as appropriate.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 3 and 12

Claims 3 and 12 set forth a feature wherein the second via hole is positioned "2 μm or less" [to the inside of] the first via hole. However, the assertion that it is possible to achieve a desired effect by configuring so that the distance is "2 μm or less" as opposed to 5 μm or 2.1 μm is not fully supported by the description.

Claims 4 and 13

Claims 4 and 13 set forth a feature wherein the depth of the second via hole is "10 to 150 μm ." However, the assertion that it is possible to achieve a desired effect by configuring so that the depth is "10 to 150 μm " as opposed to 9 μm or 151 μm is not fully supported by the description.

Claim 9

Claim 9 sets forth a feature wherein the second via hole is positioned so as to be separated by a distance of "5 to 50 μm " from the end part of the bottom surface of the first via hole. However, the assertion that it is possible to achieve a desired effect by configuring so that the distance is "5 to 50 μm " as opposed to 4 μm or 51 μm is not fully supported by the description.

Claims 11 and 14

Claims 11 and 14 set forth a feature wherein the resonance frequency distribution is set to "within \pm 0.42%." However, the assertion that it is possible to

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achieve a desired effect by configuring so that the resonance frequency distribution is "within $\pm 0.42\%$ " as opposed to within $\pm 0.43\%$ or within $\pm 0.54\%$ is not fully supported by the description.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box. I

The amendment to claim 10, which delimits a numerical range of "0.3 μm to 0.5 μm " for the thickness of the insulating layer, goes beyond the scope of the disclosure in the international application as originally filed.